

Geel 2000 Language Schools
Science Department
Primary (5)
Concept (4.1) , (4.2)
Second term
(2025/2026)

Name:.....

Class:.....

Concept (4.1)
Effects of gravity
Lesson (1)

We find the effect of gravity in everything around us.

Gravity:

- It is the force that pulls objects with mass toward the center of Earth.
- It is the force of attraction between objects.
- It is an invisible force.
- It is a pull force only.

How does gravity affect the movement of objects?

- The force of gravity pulls objects down toward the ground, such as **skydivers** that fall down toward the ground.
- Gravity pulls objects toward **the center of Earth**.
- The force of gravity between the Sun and objects in the solar system **keeps the planets revolve in fixed orbits**.
- The force of gravity is pulling the moon, as a result, **the moon still revolves in its orbit around Earth**.
- If there were no gravity between the moon and Earth, **the moon would just float off into space**.
- The gravity of the moon affects **the ocean tides**.



➤ **Factors affect the gravity: -**

- On the Earth's surface, objects with large masses have more gravity than that of objects with small masses.
- ❖ Gravitational force (gravity) of an object **increases**, as its mass **increases** and vice versa.
- ❖ Gravitational force (gravity) **decreases**, when the distance between two objects **increases** and vice versa.

Give a reason: -

- In basketball game, each time the ball is thrown into the air, it falls down toward the ground.

Due to gravity that pulls the ball down toward the ground.



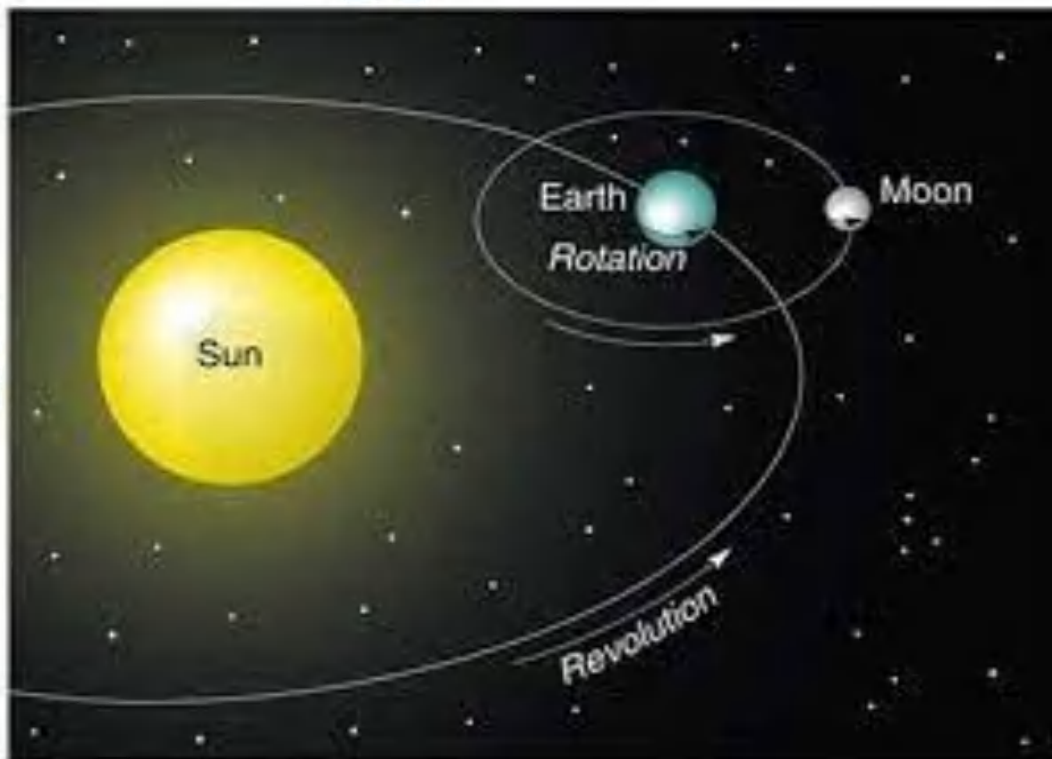
What happens if?

1. The mass of the moon becomes twice its real mass.

The moon would have more gravity, so it would pull closer to Earth and it might even crash into Earth.

2. The distance between the moon and Earth becomes twice than it is.

The gravitational attraction between them would become smaller.



Lessons (2, 3)

- Forces are needed to make things move.

Force:

It is a pull or a push that is applied to an object.

Example

- The paper clips can be attracted to the magnet, if the magnet does not touch them.
- Forces can affect different objects in two ways which are contact force and noncontact force, where:
 - In contact force, the two objects need to contact each other for the motion of one object, as **when you kick a ball, your foot must contact the ball to make it move.**
- Motion means **a change in the position of an object compared to another object**
- In noncontact force, the two objects do not need to touch or contact each other for the motion of one object, as **the magnet does not need to touch the paper clips to attract them.**

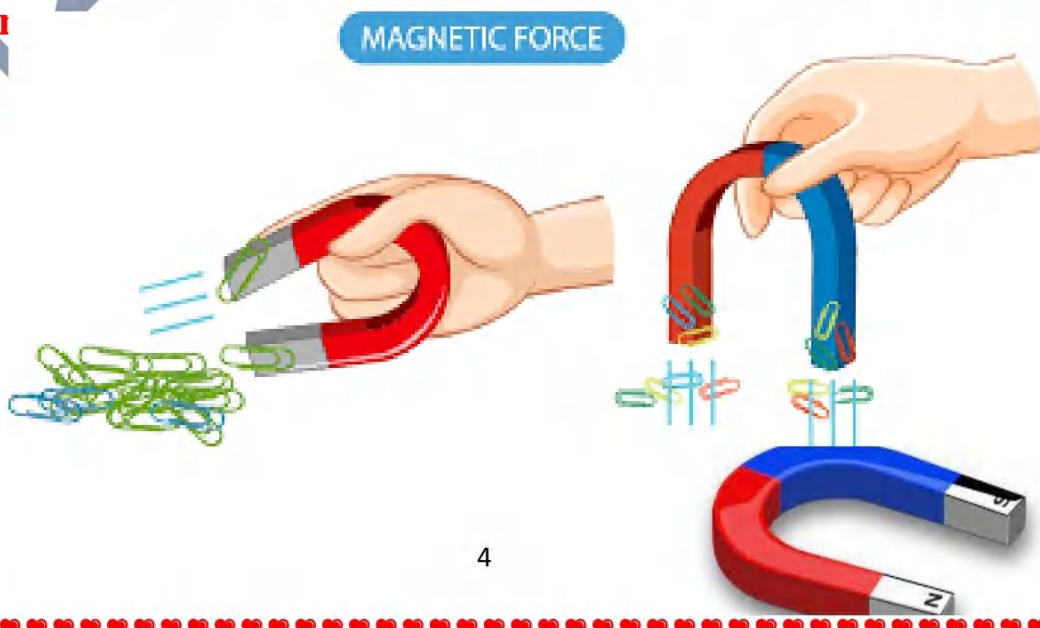
Forces can pull or push objects in different directions.

Some forces are weak, like **the push force needed to move a toy car**, while other forces are strong, like **the push force needed to move a real car.**

❖ Types of forces: -

As **magnetism, wind, gravity.....etc.**

1. Magnet has a kind of invisible force that cannot be seen, **known as magnetism**



Magnetism:

- It is the force of attraction or repulsion between two magnets or between a magnet and an object.
- Magnet can exert a **pulling** force or a **pushing** force using the force of magnetism as follows:

Type	a. Pulling force of magnet:	b. Pushing force of magnet:
Cause	Magnet pulls paper clips up.	Magnet pushes away another one.
Effect	Paper clips move to it.	The other magnet is pushed away.

2. Cause: Wind pushes on the blades of a wind turbine.

Effect: Wind turbine blades move.



3. Cause: You squeeze a spring.

Effect: The spring pushes back when you leave it free.



4. Cause: Gravity pulls a cup you drop to the floor.

Effect: The cup falls to the ground.

❖ We know gravity is a force (G.R)

Because we can see its effects around us, such as when something falls.

Gravity : it is the force of attraction that exist between objects.

For example:

An egg could slip out of your hand and fall to the floor.

❖ The force of gravity keeps us from floating into space like that happens with astronauts.



- ❖ When you drop a ball or a book, it falls down toward the ground.
- ❖ In space, there are big and small planets, where bigger planets have more gravity than that of smaller planets.
- ❖ The force of gravity keeps the planets revolve in their orbits or on fixed paths around the Sun.



- ❖ Like the gravity of planets in space, we can say that:
Gravity changes the direction of anything you throw into the air.

➤ Note

Gravity does not only act on falling or moving objects but **also, it acts on objects that do not move**, such as a boy sits on a chair or a book on a shelf.

- All objects have gravity (G.R)

Because they all have mass.

- ❖ Objects with greater mass exert greater force on objects around them as in the **Earth-and-moon** system where :
 - Earth is bigger than the moon and it has more mass so, Earth has stronger gravity than the moon
 - Also, the gravity of the moon causes the attraction of Earth toward the moon.
 - The moon stays in a fixed orbit around Earth due to the gravitational force of Earth
 - All objects on or near Earth's surface are pulled down toward the center of Earth.
 - The weight is always being pulled toward the ground.

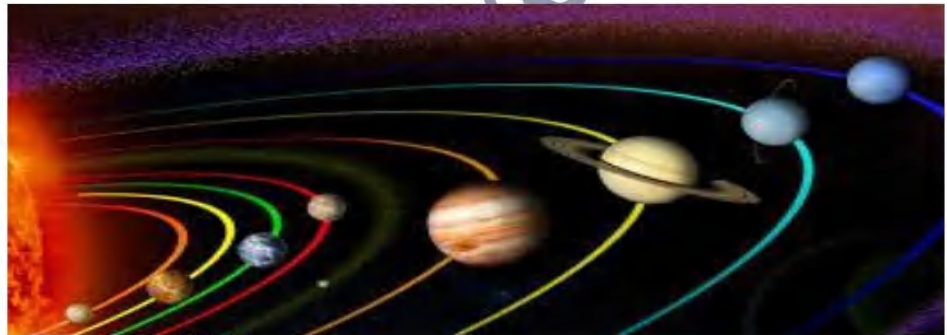


Lesson (4)

- ❖ You cannot see gravity, but you know it is there (G.R) **because you can see its effects.**

➤ Examples:

- The Sun pulls all planets toward it.
- Gravity keeps our planet in an orbit around the Sun.
- Gravity keeps our atmosphere around Earth.
- On Earth, gravity pulls everything (such as humans, rocks, water bodies, animals, chairs, etc.) and holds them to the ground toward the center of Earth.
- Skydivers and their parachutes are pulled downward toward Earth's surface.



➤ Give a reason for:

- Objects like balls drop to the ground after being thrown up into the air.

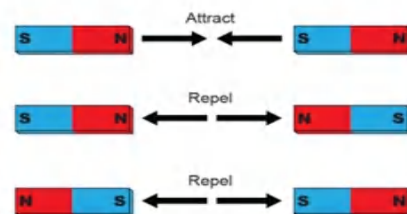
Due to Earth's gravity that pulls them down toward the ground.

Magnetism:

It is a force that attracts metal objects made of iron, nickel or cobalt by pulling on them.

➤ Example:

- Some iron nails can be attracted to a magnet due to its pulling force on them.



Friction:

- It is a force generated between two touching surfaces.
- It is a force that opposes the motion of a body across a solid surface or through a gas or liquid.

❖ Friction slows the movement of objects.

➤ Example:

A bicycle brake pulls back the movement of the tires by friction when the bicycle brake rub against the tires.



Air resistance

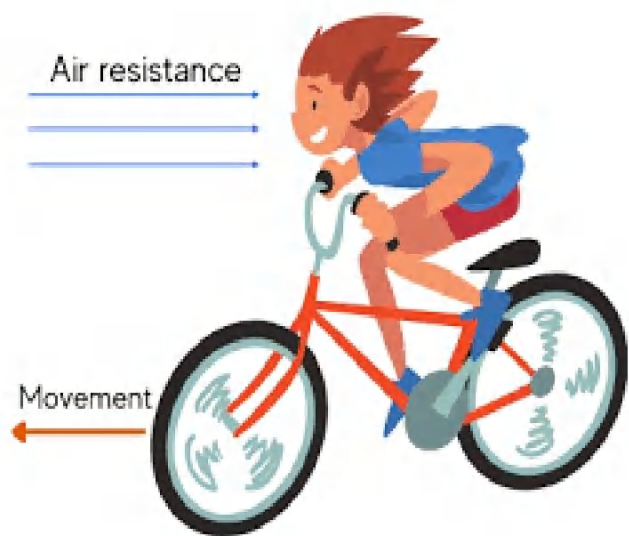
- It is considered as a type of friction force.
- It is a force that opposes the movement of an object as it passes through air.

➤ Example:

Skydiver releases parachute to slow his drop, where:

When the skydiver open his parachute, it gets filled with air **due to the upward flow of wind forming air resistance to the parachute.**

The air resistance pulls the skydiver backward and slows his fall to Earth's surface.



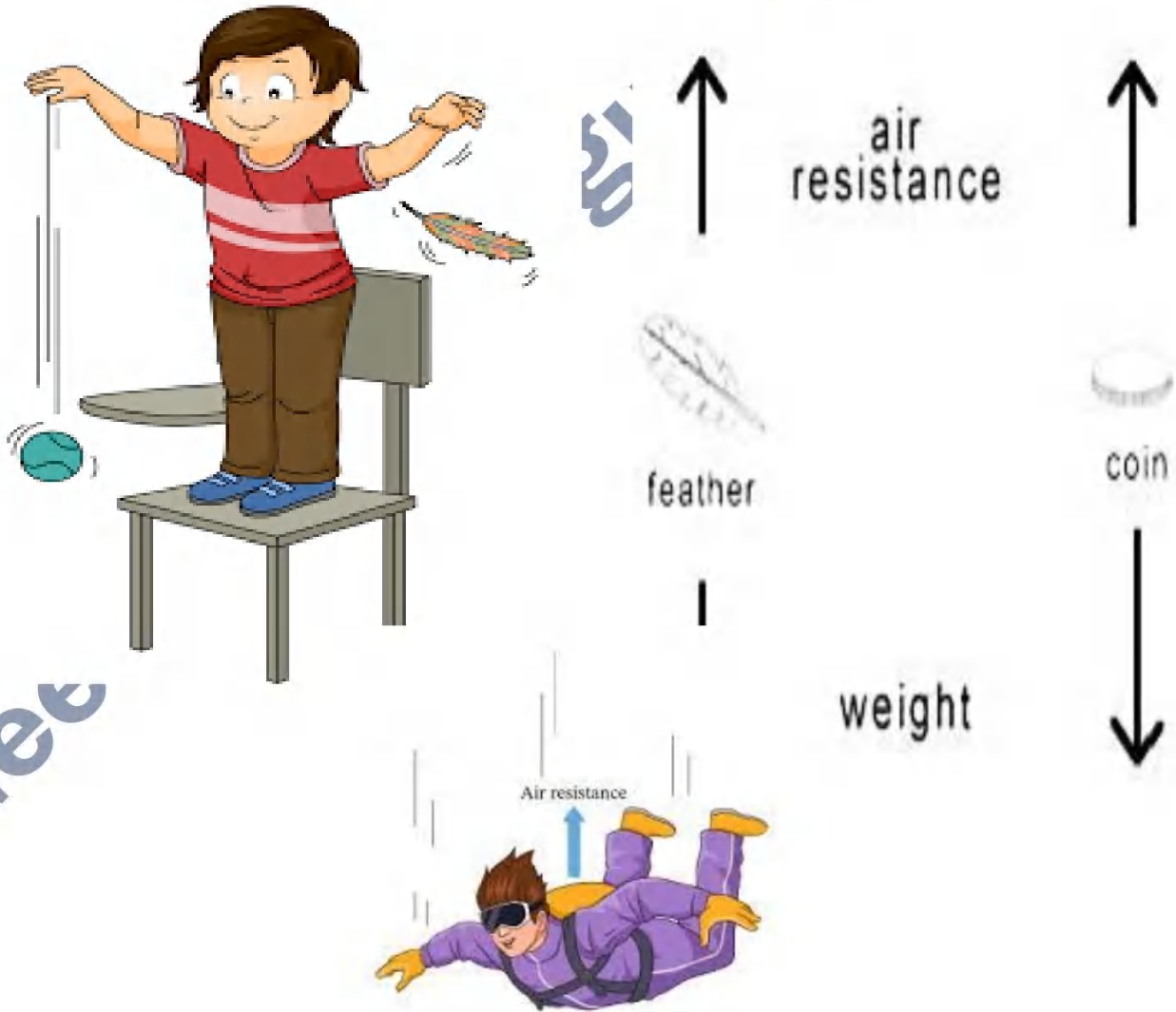
Lesson (5)

Law of Motion:

The force of gravity is constant and acts on all objects in the same way.

Imagine that there is no air resistance on Earth:

So, according to **the law of motion**, if we drop a hammer and a paper at the same time from the same height, they will reach the floor at the same moment because **gravity acts on all objects in the same way**, where the mass or the shape of the objects would not matter.



Lesson (6)

Our solar system consists of the Sun and a group of planets revolve around it.

In 1543, a scientist called **Nicolaus Copernicus** stated that Earth revolves around the Sun.

In the solar system, each planet revolves around the Sun in a fixed path called an **orbit**.

The orbit of each planet has an **ellipse (oval)** shape.

Earth revolves around the Sun at a speed nearly equals **107000 km per hour**.

What keeps the planets revolve around the Sun in fixed orbits?

Gravity is the invisible attraction or pulling force that holds all the planets in their places.

The great gravitational pulling force of the Sun keeps the planets revolving in fixed orbits.

If there were no gravity, the planets would fly off into space.

➤ Give a reason for:

- The Sun is the only center of motion in the solar system.

Because the Sun is much bigger than all the other objects in the solar system, so its gravity pulls the other planets toward it.



Concept (4.2)

Patterns of Motion in the Sky

Lesson (1)

What causes the cycle of day and night and why do the Sun, planet and Stars appear to move across the sky?

➤ Earth's rotation causes:

- The cycle of day and night.
- The Sun, planets and stars appear to move across the sky.
- Shadows of objects to move throughout the day.

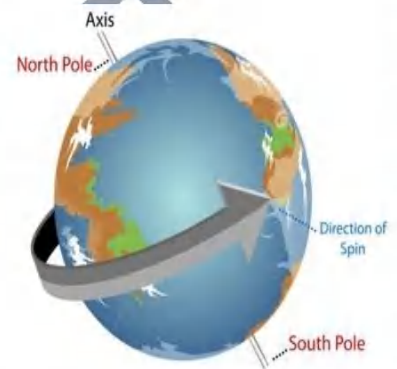
Day and night

- Earth spins (rotates) all the time.
- We cannot feel Earth spinning, but we know that from the regular pattern of day and night.
- The phenomenon of regular pattern of day and night happens due to Earth's rotation on its axis.

Earth's axis

It is an imaginary line passing through the North and South poles.

Earth takes a whole day (24 hours) to make one complete turn on its axis.

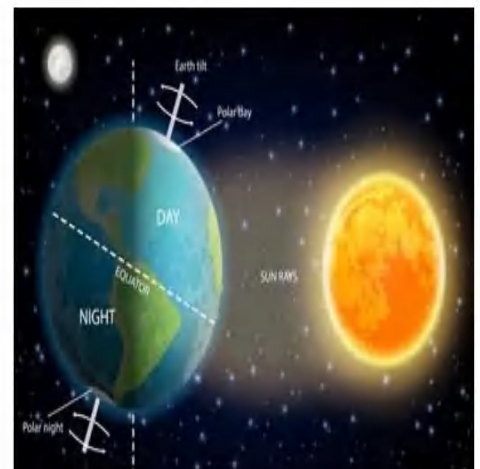


During Earth's rotation:

- Half of Earth faces the Sun, so this part has day.
- The other half of Earth faces away from the Sun and doesn't receive any light, so this part has night.

Note:

- The rotation of Earth causes:
- Regular pattern of day and night.
- The appearance of the Sun as it is moving across the sky.



Where is the Sun in the sky?

-The Sun appears to change its direction in the sky during the day.

-When you are facing the north direction of Earth and stretch your arms, you will see that:

-In early morning

The Sun would be to your right (east), rising in the sky.

-At noon:

The Sun would be above you in the center of the sky.

-In late afternoon:

The Sun would be to your left (west), setting in the sky.

Note

If you change your direction, facing north or south, the Sun will always rise in the east and set in the west.

Rotation or revolution

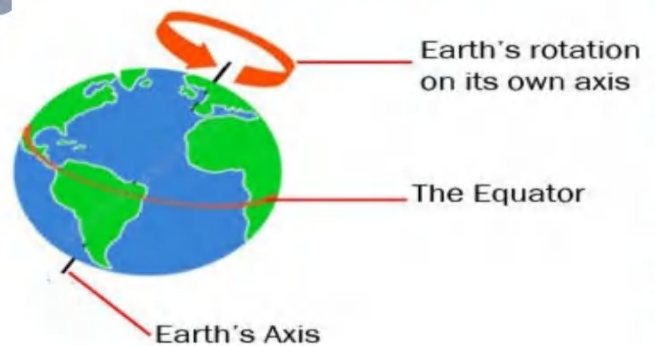
Rotation:

It is the spinning of an object around an axis.

Example:

Earth rotates on its axis.

Earth's Rotation

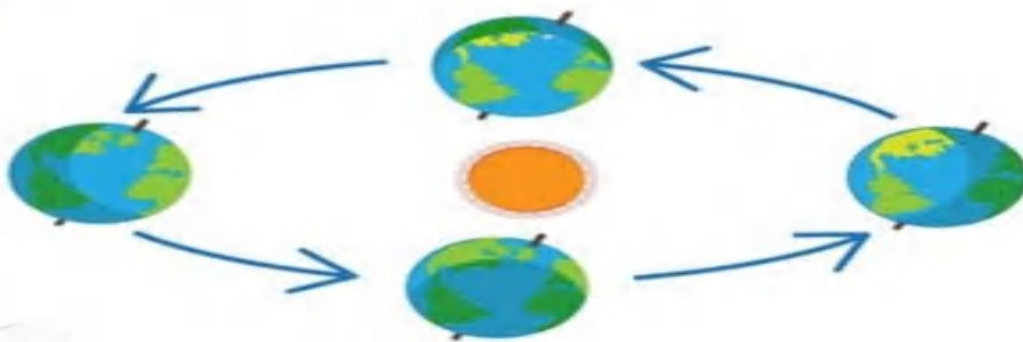


Revolution

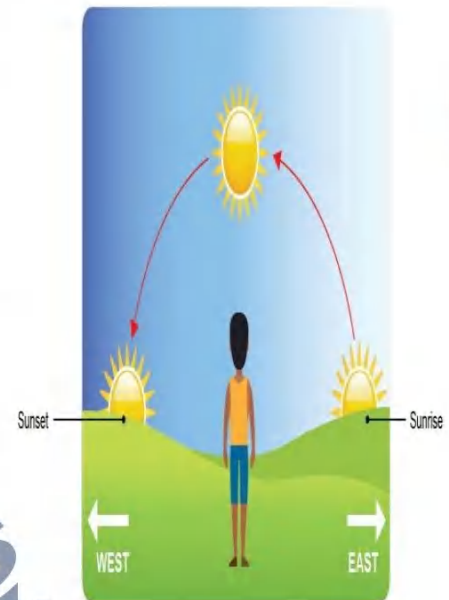
-It is the orbiting of an object around another object

Example:

Earth revolves around the Sun in an orbit.



Sunrise and Sunset



Lesson (2)

Rotation

Cycle of day and night:

-Cycle means a series of events that is repeated in the same order for

example:

- The cycle of day and night.
- The cycle of seasons.
- Earth rotates **counterclockwise** on its vertical axis that passes through the two poles of earth causing the cycle of day and night.

Note:

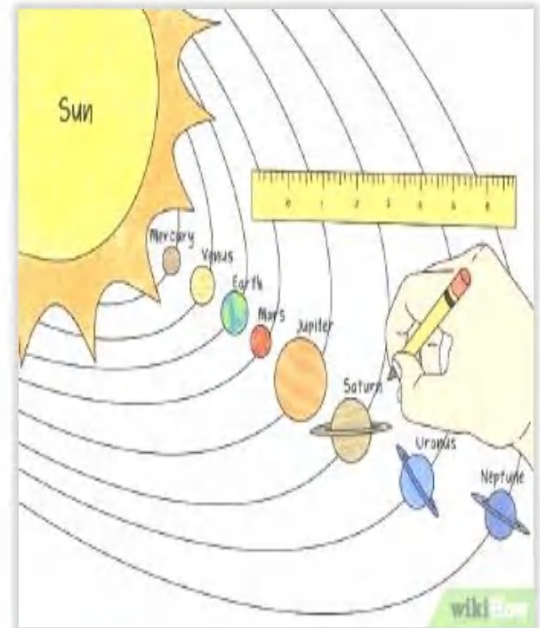
Earth's revolution around the Sun causes the cycle of seasons.

Solar system:

- Solar system includes the Sun and eight planets that revolve around the Sun in fixed orbits.
- Planets rotate on their **axes** at different speeds.
- Jupiter is the **fastest** planet that rotates on its axis in the solar system (**Jupiter is one of the eight planets of solar system**).

Note:

- Earth revolves around the sun in an **elliptical orbit** and the angle of **tilt** changes throughout the year .
- Earth is slightly **titled** on its axis .



- **G.R:** sun travel across the sky in different speed each day .

➡ Because of the elliptical orbit of earth and the tilt of earth on its axis

❖ Sunrise and sunset in some cities in Egypt :

- Sun rises from **east** and sets from **west** so **the cities in east** see the sunrise before **the cities in west**

EX:

Maras Alam (east of Egypt) sees the sunrise 46 minutes before **siwa** (west of Egypt) so the length of day in maras alam is always **longer** than it in siwa .

Lesson (3)

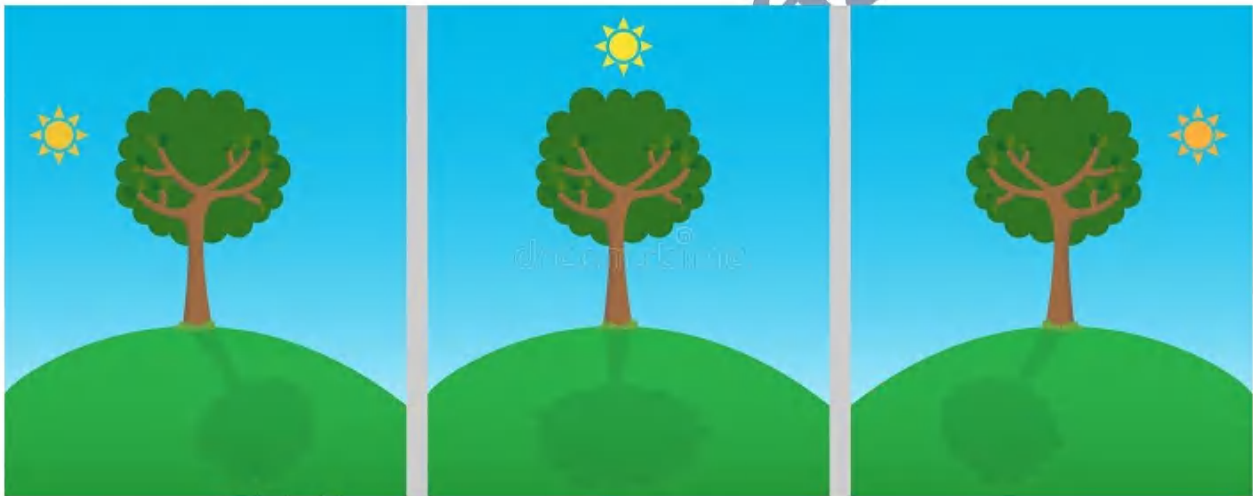
Movement of objects in the sky

- Earth's rotation on its axis causes celestial bodies such as (the Sun and stars) appear to move in the sky such as:
- The Sun appears to rise in the east and set in the west.
- Stars seem to move in the sky at night**, where some stars seem to rise and set like the Sun.

Notes

1. The Sun causes the formation of shadows of objects on Earth.
2. As the Sun appears to move in the sky, this causes the movement of shadows of objects which proves that Earth rotates on its axis.

For example: the shadow of a tree.



Factors that affect the length and angle of shadow:

1. The position of the Sun in the sky, where:
 - At noon**, the Sun is high and most directly above us in the sky, so it forms the **shortest** shadows of objects.
 - **In morning and afternoon**, the Sun is low and at east or west in the sky, so it forms **longer** shadows of objects.
2. The amount of sunlight that reaches the Earth's surface during different seasons.

Lesson (4)

Constellation:

It is a group of stars that forms a pattern or looks like a certain shape in the sky.

Stars that form a constellation are not connected to each other but, if these stars are connected by imaginary lines, they will look like an object, animal or person.



For example:

The Constellation Orion that ancient Greeks gave it this name relative to a **mythical hunter**.

Constellations

Starlight

- Stars make their own light where they are made of **hot gases** that make them bright.
- Some stars are **larger** than the Sun while others are smaller than it.
- Planets and moons don't make their own light.
- We see the moon bright in the sky (G.R) because it reflects light from the Sun.**



Constellations

- Some constellations are always **visible** in the sky, while other constellations can be seen only during specific seasons.
- Stars closer to the north and south poles move slightly in the sky**, so the place of these stars (constellations) changes a little bit in the night sky throughout the year.

Note

Location of constellations in the sky during the year, help us to determine the main directions (north, south, east and west).

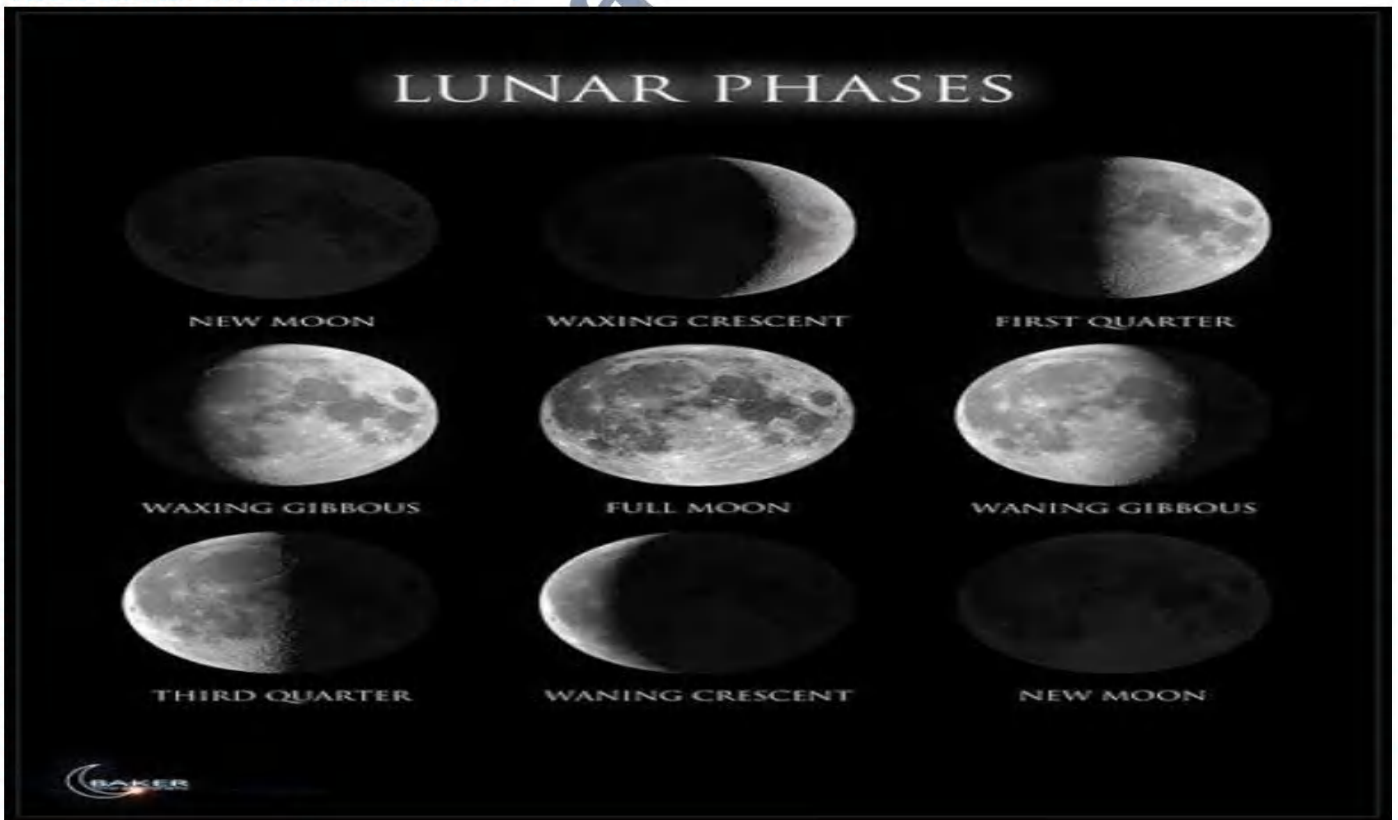
Lesson (5)

- The moon revolves around the earth in an elliptical orbit.
 - (G.R) moon have different phases in the night sky .
- ➔ Due to earth's revolution around sun , moon revolution around earth and both earth and moon revolve around sun .



❖ The moon phases during the lunar month :

- The moon phase are changed during the lunar month called Hijri month
- the cycle of moon phases or lunar phases is repeated at the beginning of each lunar month as follow :



2- First phase is called **first crescent** which moon appears illuminated crescent and its size increase

then

1- One half of the moon's face is illuminated and the other half is darkened is called **first quarter**

then

8- **new moon**: it's a phase that moon faces earth is fully illuminated and appears in the last day of the lunar month

then

3- The brighten part of the moon's face increase and line separating the lighted part and the darkened part appears curved and this phase called **first gibbous**

Then

7- **second crescent** : the moon's face appears illuminated crescent

then

4- **Full moon** : this face appears in the middle of lunar month and appears fully illuminated

then

6- **second quarter** : one half of the moon's face is darkened and the other half other illuminated .

then

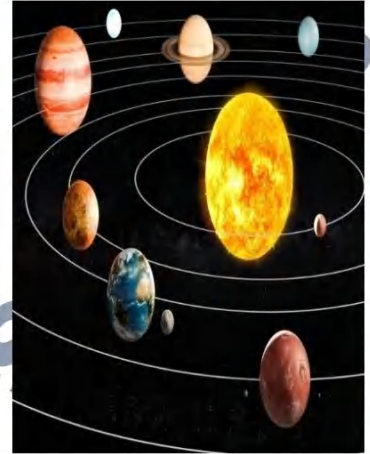
5- **second gibbous** : the brighten part of moon's face decreases and the line separating the darkened part and the lighted part appears curved

then

Lesson (6)

The Sun

- It is a medium-sized star.
- It is the only star that is located in our solar system, while other stars are farther away from the solar system.
- It appears so bright in the sky, because it is the largest in the solar system and it is the



Solar system closest star to Earth.

- It provides Earth with heat and light which are necessary for continuity of life on Earth.

When you look at night sky, you will see a huge number of stars.

Stars

They are giant spheres of superhot gases most of them are hydrogen and helium.

Stars appear bright in the sky due to burning of gases that form these stars.

Observing stars at night

How does the Sun produce heat (thermal energy) and light energy? The Sun uses the energy produced from reactions between gases inside it to give off heat (thermal energy) and light energy.

Scientists have been interested in studying the Sun patterns of motion.

Examples of these scientists:

1 Copernicus: He proved that the Sun is the center of our solar system.

2 Albert Einstein: He explained how the Sun converts matter directly into energy (light and heat) that reaches planet Earth.

Notes

1. As a result of the huge mass of the Sun, it has a great gravitational pulling force that keeps 8 planets including Earth and more than 200 moons in continuous fixed orbits around the Sun.

2. Some scientists believe that the number of stars is more than all the grains

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of sand on Earth's beaches.



How do we study the stars?

Stars can help us understand how our galaxy and other galaxies formed.

Galaxy:

It is a group of stars, planets and gases held together by gravity.



Universe:

is the wide space that contains celestial objects as stars, galaxies, comets, meteors and human-made satellites like the **International Space Station**

If you look into space, you can see some celestial objects with naked eye but most of these celestial objects appear as small light dots, so it is hard to differentiate between them.

As the universe is so big, many objects are too faraway to be seen with the naked eye.

Astronauts cannot be sent to study these very distant objects like stars.

Technology helps human to invent some tools to see distant objects in more details such as:

Binoculars:

Such as Galileo binoculars



Telescopes:

Such as Hubble Space Telescope



Notes :

- (G.R) : atmosphere limits the using of some telescopes to see distant celestial bodies .



Because it allows some light waves to pass to the earth and blocks others .

- **Planetarium** : it's a place where we can see images of the stars, planets, constellations and other celestial bodies .

or

- **Planetarium** : is a special building with dome ceiling and used to see images of celestial bodies .
- **Planetarium directors** : they are **scientists** who study the behaviors and properties of celestial bodies in space .
- **Planetarium directors** → **manage the planetarium buildings**

Responsible for making an amazing realistic show to bring outer space to earth .

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التطبيق وتحميل كل الملازم مجاناً وبسرعه



حمل التطبيق الآن



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